PATENT

Attorney Docket No. SIC-04-030

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of:
TATSUYA KAWAKAMI
Application No.: 10/710,610
Filed: July 23, 2004
For: SHIFT CONTROL DEVICE FOR A BICYCLE TRANSMISSION

Examiner: Vicky A. Johnson
Art Unit: 3682

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

This is an appeal brief for the above-captioned matter.

I. Real Party In Interest

The assignee and real party in interest is Shimano, Inc., a Japanese corporation having a principal place of business in Osaka, Japan.

II. Related Appeals And Interferences

There are no prior or pending appeals, interferences or judicial proceedings known to the appellant, to appellant's legal representative, or to the assignee which may be related to, directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. Status Of Claims

Claims 1-58 and 70-93 are pending under final rejection and are under appeal. Claims 59-69 have been canceled.

IV. Status Of Amendments

No amendment was filed subsequent to final rejection.

V. Summary Of Claimed Subject Matter

The application discloses several embodiments of an apparatus used to shift a bicycle transmission. In the following discussion, cited reference numbers and text are examples only and are not intended to be limiting. Line numbers refer to the line numbers within each individually cited paragraph.

As recited in independent claim 1, a shift control device ((10), Fig. 1, page 5, paragraph [0017], lines 1-2) for a bicycle transmission comprises:

a mounting member ((22), Fig. 2, page 5, paragraph [0017], line 4) adapted to mount the shift control device (10) to a bicycle;

a first lever ((28), Fig. 1, page 5, paragraph [0017], lines 4-5) operatively coupled to the mounting member (10) such that the first lever (28) automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever (because of the plurality of positioning teeth ((134), Fig. 2, page 6, paragraph [0022], lines 1-5, together with positioning pawl (41), Fig. 2, page 7, paragraph [0023], lines 1-5), wherein the first lever (28) moves in a first plane ((P1), Fig. 3, page 6, paragraph [0020], lines 6-7);

a second lever ((40), Fig. 1, page 5, paragraph [0017], lines 7-8) operatively coupled to the mounting member (22) for movement in a second plane ((P2), Fig. 4, pages 7-8, paragraph [0025], lines 11-13) between a rest position (shown in Fig. 3) and an operating position (shown in Fig. 4 and described at page 9, paragraph [0029], lines 2-4) such that the second lever (40) returns to the rest position after moving to the operating position (as described at page 2, paragraph [0005], lines 4-6 and page 9, paragraph [0029], lines 9-18;

wherein the first plane (P1) is substantially parallel to the second plane (P2) (pages 7-8, paragraph [0025], lines 11-13);

a positioning unit ((34), Fig. 2, page 5, paragraph [0017], line 6) that rotates to a plurality of positions corresponding to gear positions of the bicycle (as explained at pages 8, paragraph [0027], lines 1-8); and

a positioning member ((41), Fig. 2, page 5, paragraph [0017], line 8) that moves relative to the second lever (40) and that is controlled by the second lever (40) to operate the positioning unit (34) (as explained at page 9, paragraph [0029], lines 1-18).

As recited in independent claim 15, a shift control device ((10), Fig. 1, page 5, paragraph [0017], lines 1-2) for a bicycle transmission comprises:

a mounting member ((22), Fig. 2, page 5, paragraph [0017], line 4) adapted to mount the shift control device (10) to a bicycle;

a first lever ((28), Fig. 1, page 5, paragraph [0017], lines 4-5) operatively coupled to the mounting member (10) such that the first lever (28) automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever (because of the plurality of positioning teeth ((134), Fig. 2, page 6, paragraph [0022], lines 1-5, together with positioning pawl (41), Fig. 2, page 7, paragraph [0023], lines 1-5);

a second lever ((40), Fig. 1, page 5, paragraph [0017], lines 7-8) operatively coupled to the mounting member (22) for movement between a rest position (shown in Fig. 3) and an operating position (shown in Fig. 4 and described at page 9, paragraph [0029], lines 2-4) such that the second lever (40) returns to the rest position after moving to the operating position (as described at page 2, paragraph [0005], lines 4-6 and page 9, paragraph [0029], lines 9-18);

a positioning unit ((34), Fig. 2, page 5, paragraph [0017], line 6) that rotates to a plurality of positions corresponding to gear positions of the bicycle (as explained at page 8, paragraph [0027], lines 1-8); and

a motion limiting member ((175), Fig. 3, page 7, paragraph [0025], lines 5-7) operatively coupled to the second lever (40) to limit motion of the positioning unit (34) during operation of the second lever (40) (as explained at page 9, paragraph [0029], lines 7-9).

As recited in independent claim 28, a shift control device ((10), Fig. 1, page 5, paragraph [0017], lines 1-2) for a bicycle transmission comprises:

a mounting member ((22), Fig. 2, page 5, paragraph [0017], line 4) adapted to mount the shift control device (10) to a bicycle handlebar ((18), Fig. 1, page 5, paragraph [0017], lines 3-4);

a first lever ((28), Fig. 1, page 5, paragraph [0017], lines 4-5) operatively coupled to the mounting member (10) such that the first lever (28) automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever (because of the plurality of positioning teeth ((134), Fig. 2, page 6, paragraph [0022], lines 1-5, together with positioning pawl (41), Fig. 2, page 7, paragraph [0023], lines 1-5);

a second lever ((40), Fig. 1, page 5, paragraph [0017], lines 7-8) operatively coupled to the mounting member (22) for movement between a rest position (shown in Fig. 3) and an operating position (shown in Fig. 4 and described at page 9, paragraph [0029], lines 2-4) such that the second lever (40) returns to the rest position after moving to the operating position (as described at page 2, paragraph [0005], lines 4-6 and page 9, paragraph [0029], lines 9-18;

a positioning unit ((34), Fig. 2, page 5, paragraph [0017], line 6) that rotates to a plurality of positions corresponding to gear positions of the bicycle transmission (as explained at page 8, paragraph [0027], lines 1-8) in response to movement of one of the first lever (28) and the second lever (40) (as explained at page 8, paragraph [0027], lines 1-8 and at page 9, paragraph [0029], lines 1-18); and

wherein the first lever (28) and the second lever (40) are coupled to the mounting member (22) such that the first lever (28) and the second lever (40) are located above the bicycle handlebar (18) when the shift control device (10) is mounted to the handlebar (18) (as shown in Fig. 1).

As recited in independent claim 41, a bicycle control apparatus comprises:

a mounting member ((22), Fig. 2, page 5, paragraph [0017], line 4) adapted to mount the bicycle control apparatus (10) to a bicycle;

a positioning unit ((34), Fig. 2, page 5, paragraph [0017], line 6) coupled to the mounting member (22) for moving to a plurality of positions (as explained at page 8, paragraph [0027], lines 1-8); and

a positioning member ((41), Fig. 2, page 5, paragraph [0017], line 8) that maintains the positioning unit (34) in each of the plurality of positions (as explained at page 7, paragraph [0023],

lines 1-5), wherein the positioning member (41) comprises a material that deforms in response to excessive force applied between the positioning member (41) and the positioning unit (34) (as explained at page 7, paragraph [0023], lines 5-7) to release the positioning unit (34) from a maintained position (as explained at page 7, paragraph [0023], lines 7-10). See also page 3, paragraph [0007], lines 4-6.

As recited in independent claim 55, a shift control device ((10), Fig. 1, page 5, paragraph [0017], lines 1-2) for a bicycle transmission comprises:

a mounting member ((22), Fig. 2, page 5, paragraph [0017], line 4) adapted to mount the shift control device (10) to a bicycle;

a positioning unit ((34), Fig. 2, page 5, paragraph [0017], line 6) coupled to the mounting member (22) for moving to a plurality of positions (as explained at page 8, paragraph [0027], lines 1-8);

a first lever ((28), Fig. 1, page 5, paragraph [0017], lines 4-5) that moves in a first lever direction ((A), Fig. 3, page 8, paragraph [0027], lines 1-8) to move the positioning unit (34) in a first gear position direction;

a second lever ((40), Fig. 1, page 5, paragraph [0017], lines 7-8) that moves in a second lever direction ((B), Fig. 4, page 9, paragraph [0029], lines 1-4) to initiate movement of the positioning unit (34) in a second gear position direction opposite the first gear position direction (as explained at page 9, paragraph [0029], lines 1-7);

wherein the first lever direction (A) is the same as the second lever direction (B) (readily apparent from Figs. 3 and 4);

a motion allowing member ((41), Fig. 2, page 5, paragraph [0017], line 8) coupled to the mounting unit (22) to allow movement of the positioning unit (34) in the second gear position direction (as explained at page 9, paragraph [0029], lines 1-7); and

a motion limiting member ((175), Fig. 3, page 7, paragraph [0025], lines 5-7) retained to the second lever (40) and moving in the second direction (B) to limit motion of the positioning unit (34) in the second gear position direction during operation of the second lever (40) (as explained at page 9, paragraph [0029], lines 1-9).

As recited in independent claim 70, a bicycle control apparatus comprises:

a mounting member ((22), Fig. 2, page 5, paragraph [0017], line 4) adapted to be mounted to a bicycle;

a positioning unit ((34), Fig. 2, page 5, paragraph [0017], line 6) coupled to the mounting member (22) for moving to a plurality of positions (as explained at page 8, paragraph [0027], lines 1-8);

a positioning member ((41), Fig. 2, page 5, paragraph [0017], line 8) that maintains the positioning unit (34) in each of the plurality of positions (as explained at page 7, paragraph [0023], lines 1-5);

wherein the positioning member (41) moves along a first path (e.g., rotation around mounting axle (118, Figs. 2-4) as explained at page 9, paragraph [0029], lines 2-4 and 9-12) between an engagement position, where the positioning member (41) engages the positioning unit (34) (as shown in Fig. 3), and a disengagement position where the positioning member (41) is disengaged from the positioning unit (34) (e.g., when positioning member (41) clears the tip of the positioning tooth as explained at page 9, paragraph [0029], line 5); and

wherein the positioning member (41) moves along a second path (e.g., when mounting axle (118) moves linearly along elongated opening (114) as described at page 8, paragraph [0027], lines 2-5 and at pages 8-9, paragraph [0028], lines 9-10) that is different from the first path. Please refer to the corrected text of paragraphs [0027]-[0028] in the preliminary amendment filed August 20, 2004 for the correct description of the movement along the second path.

VI. Grounds of Rejection to be Reviewed on Appeal

Claims 1-58 and 70-93 stand rejected under 35 U.S.C. §102(b) as being anticipated by Ose (US 5,768, 945).

VII. Argument

Rejection under 35 U.S.C. §102(b) over Ose

Claims 1-10

Ose discloses a bicycle shift control device comprising a winder (3, Fig. 2) rotatably mounted to a spindle (2), a positioning member (16) mounted to winder (3) so that positioning member (16) and winder (3) rotate as a unit, a winding lever (4) that moves a feed pawl (6) against ratchet teeth (16a) of positioning member (16) to rotate positioning member (16) and winder (3) in a cable winding direction, and a rewinding lever (10) with a release member (23) that controls the operation of first and second positioning pawls (8) and (9) to control the rotation of winder (3) in a cable unwinding direction. Winding lever (4) moves from an initial position (N1) to an operating position to control the rotation of winder (3) in the cable winding direction, and winding lever (4) automatically returns to the initial position (N1) after the gear shift operation in response to the biasing action of a return spring (21). Similarly, rewinding lever (10) moves from an initial position (N2) to an operating position to control the rotation of winder (3) in the cable unwinding direction, and rewinding lever (10) automatically returns to the initial position (N2) after the gear shift operation in response to the biasing action of a return spring (24).

Claim 1 recites a first lever that automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever. The final office action dated July 24, 2008 interpreted Ose's rewinding lever (10) to be a first lever, and the office action interpreted Ose's winding lever (4) to be a second lever. Ose's winding lever (4) and rewinding lever (10) at most stop at their beginning and end positions. Neither winding lever (4) nor rewinding lever (10) automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the lever. Thus, Ose neither discloses nor suggests a first lever that automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever.

Claim 11

Claim 11 recites a motion limiting member that limits movement of the positioning unit in response to movement of the second lever. The final office action interpreted the motion limiting member to be Ose's second positioning pawl (9). However, positioning pawl (9) operates independently of Ose's winding ("second") lever (4). Movement of Ose's winding lever (4) does not

cause pawl (9) to limit movement of winder ("positioning unit") (3). As stated at column 3, lines 58-63, pawls (8) and (9) simply move over the ratchet teeth (16a) as winding lever (4) moves. Ose's positioning pawl ("motion limiting member") (9) does not limit movement of winder ("positioning unit") (3) at any time during the operation of winding lever (4).

Claim 12

Claim 12 recites "wherein the motion limiting member is retained to the second lever." However, positioning pawl (9) is not retained to winding ("second") lever (4). Positioning pawl (9) is mounted to a guide member (22) that is retained to a stationary spindle (2). Positioning pawl (9) is not retained to winding lever (4).

Claim 13

Claim 13 recites "wherein the motion limiting member is one piece with the second lever." As noted above, positioning pawl (9) is mounted to a guide member (22) that is retained to a stationary spindle (2). Positioning pawl (9) is not one piece with winding ("second") lever (4).

Claim 14

Claim 14 recites "wherein the first lever and the second lever are coupled to the mounting member such that the first lever and the second lever are located above the bicycle handlebar when the shift control device is mounted to the bicycle handlebar." Ose's control device (A) is attached to a bicycle handlebar (H). Handlebar (H) comprises a main handlebar (H1) and sub-handlebars (H2) that project forward. Control device (A) is supported *below* handlebar (H) by a support bracket (11) that, as shown in Fig. 1, extends downwardly from handlebar (H2). Thus, levers (4) and (10) are located below handlebar (H).

To shift gears with lever (4), a first finger tab (4a) is pushed forward with the index finger (typically with the fingernail or front of the finger knuckle) while the hand grasps a first grip (G1). Alternatively, a second finger tab (4b) is pushed to the left (in Fig. 1) with the thumb (typically with the thumbnail or the side of the thumb) while the hand grasps a second grip (G2). To shift gears with lever (10), a first finger tab (l0a) is pulled with the index finger while the hand grasps first grip (G1).

Alternatively, a second finger tab (10b) is pulled with the thumb while the hand grasps the second grip (G2). It would be impossible to operate levers (4) and (10) while simultaneously grasping the corresponding grip (G1) or (G2) if the levers were located above handlebar (H).

Claims 15-16, 18-24 and 27

Independent claim 15 recites a first lever that automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever. As noted above, Ose's winding lever (4) and rewinding lever (10) at most stop at their beginning and end positions. Neither winding lever (4) nor rewinding lever (10) automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the lever. Thus, Ose neither discloses nor suggests a first lever that automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever.

Claim 15 also recites a motion limiting member operatively coupled to the second lever to limit motion of the positioning unit during operation of the second lever. As noted above when discussing claim 11, positioning pawl ("motion limiting member") (9) does not limit movement of winder ("positioning unit") (3) at any time during the operation of winding lever (4). As stated at column 3, lines 58-63, positioning pawls (8) and (9) simply move over the ratchet teeth (16a) as winding lever (4) moves.

Claim 17

Claim 17 recites "wherein the motion limiting member is one piece with the second lever." As noted above, positioning pawl (9) is mounted to a guide member (22) that is retained to a stationary spindle (2). Thus, positioning pawl ("motion limiting member") (9) is not one piece with winding ("second") lever (4).

Claim 25

Claim 25 recites "wherein the motion limiting member is one piece with the second lever." As noted above, positioning pawl (9) is mounted to a guide member (22) that is retained to a stationary spindle (2). Thus, positioning pawl ("motion limiting member") (9) is not one piece with winding ("second") lever (4).

Claim 26

Claim 26 recites "wherein the first lever and the second lever are coupled to the mounting member such that the first lever and the second lever are located above the bicycle handlebar when the shift control device is mounted to the bicycle handlebar." As noted above when discussing claim 14, Ose's control device (A) is attached to a bicycle handlebar (H). Handlebar (H) comprises a main handlebar (H1) and sub-handlebars (H2) that project forward. Control device (A) is supported *below* handlebar (H) by a support bracket (11) which, as shown in Fig. 1, extends downwardly from handlebar (H2). Thus, levers (4) and (10) are located below handlebar (H) for the same reasons applied to claim 14.

Claims 28-37

Independent claim 28 recites a first lever that automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever. As noted above, Ose's winding lever (4) and rewinding lever (10) at most stop at their beginning and end positions. Neither winding lever (4) nor rewinding lever (10) automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the lever. Thus, Ose neither discloses nor suggests a first lever that automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever.

Claim 28 also recites "wherein the first lever and the second lever are coupled to the mounting member such that the first lever and the second lever are located above the bicycle

handlebar when the shift control device is mounted to the bicycle handlebar." As noted above when discussing claim 14, Ose's control device (A) is attached to a bicycle handlebar (H). Handlebar (H) comprises a main handlebar (H1) and sub-handlebars (H2) that project forward. Control device (A) is supported *below* handlebar (H) by a support bracket (11) which, as shown in Fig. 1, extends downwardly from handlebar (H2). Thus, levers (4) and (10) are located below handlebar (H) for the same reasons applied to claim 14.

Claim 38

Claim 38 recites a motion limiting member that limits movement of the positioning unit in response to movement of the second lever. As noted above when discussing claim 11, positioning pawl ("motion limiting member") (9) does not limit movement of winder ("positioning unit") (3) at any time during the operation of winding lever (4). As stated at column 3, lines 58-63, positioning pawls (8) and (9) simply move over the ratchet teeth (16a) as winding lever (4) moves.

Claim 39

Claim 39 recites "wherein the motion limiting member is retained to the second lever." However, positioning pawl (9) is not retained to winding ("second") lever (4). Positioning pawl (9) is mounted to a guide member (22) that is retained to a stationary spindle (2). Positioning pawl (9) is not retained to winding lever (4).

Claim 40

Claim 40 recites "wherein the motion limiting member is one piece with the second lever." As noted above, positioning pawl (9) is mounted to a guide member (22) that is retained to a stationary spindle (2). Positioning pawl (9) is not one piece with winding ("second") lever (4).

Claims 41-49 and 54

Independent claim 41 recites a positioning member that comprises a material that deforms in response to excessive force applied between the positioning member and the positioning unit to release the positioning unit from a maintained position. The final office action interpreted the

positioning member to be Ose's positioning member (16) and stated that "everything deforms to some degree." While such a broad generalization itself is questionable, the remaining claim language cannot be ignored. There is no basis to assert that Ose's positioning member (16) deforms in response to excessive force applied between positioning member (16) and positioning unit (3) to release positioning unit (3) from a maintained position.

Claim 50

Claim 50 recites a motion limiting member that limits movement of the positioning unit in response to movement of the second lever. As noted above, positioning pawl ("motion limiting member") (9) does not limit movement of winder ("positioning unit") (3) at any time during the operation of winding lever (4). As stated at column 3, lines 58-63, positioning pawls (8) and (9) simply move over the ratchet teeth (16a) as winding lever (4) moves.

Claim 51

Claim 51 recites "wherein the motion limiting member is retained to the second lever." However, positioning pawl (9) is not retained to winding ("second") lever (4). Positioning pawl (9) is mounted to a guide member (22) that is retained to a stationary spindle (2). Positioning pawl (9) is not retained to winding lever (4).

Claim 52

Claim 52 recites "wherein the motion limiting member is one piece with the second lever." As noted above, positioning pawl (9) is mounted to a guide member (22) that is retained to a stationary spindle (2). Positioning pawl (9) is not one piece with winding ("second") lever (4).

Claim 53

Claim 53 recites "wherein the first lever and the second lever are coupled to the mounting member such that the first lever and the second lever are located above the bicycle handlebar when the shift control device is mounted to the bicycle handlebar." As noted above when discussing claim 14, Ose's control device (A) is attached to a bicycle handlebar (H). Handlebar (H) comprises a main

handlebar (H1) and sub-handlebars (H2) that project forward. Control device (A) is supported *below* handlebar (H) by a support bracket (11) which, as shown in Fig. 1, extends downwardly from handlebar (H2). Thus, levers (4) and (10) are located below handlebar (H) for the same reasons applied to claim 14.

Claim 90

Claim 90 recites "wherein the positioning member flexes in response to excessive force applied between the positioning member and the positioning unit to release the positioning unit from the maintained position." Ose fails to disclose any flexing of positioning member (16) in response to excessive force applied between positioning member (16) and winder (3) to release winder (3) from any maintained position.

Claim 91

Claim 91 recites "wherein the positioning member comprises a pawl having a pawl tooth disposed on a pawl body." Ose's positioning member (16) is not a pawl.

Claim 92

Claim 92 recites "wherein a slit is disposed between the pawl tooth and the pawl body so that the pawl tooth flexes relative to the pawl body to release the positioning unit from the maintained position." In addition to the fact that Ose's positioning member (16) is not a pawl, there is no slit and tooth structure in positioning member (16) that flexes to release winder (3) from any maintained position.

Claims 55, 56 and 58

Independent claim 55 recites a motion limiting member retained to the second lever and moving in a second direction to limit motion of the positioning unit in the second gear position direction during operation of the second lever.

First, Ose's positioning pawl ("motion limiting member") (9) is not retained to winding ("second") lever (4). Positioning pawl (9) is mounted to a guide member (22) that is retained to a stationary spindle (2). Positioning pawl (9) is not retained to winding lever (4).

Second, while Ose's winding lever (4) may move in a second direction, positioning pawl (9) does not move in that direction when winding lever (4) moves.

Third, Ose's positioning pawl (9) does not limit movement of winder ("positioning unit") (3) in response to movement of winding lever (4). As noted above, positioning pawl ("motion limiting member") (9) does not limit movement of winder ("positioning unit") (3) at any time during the operation of winding lever (4). As stated at column 3, lines 58-63, positioning pawls (8) and (9) simply move over the ratchet teeth (16a) as winding lever (4) moves.

Claim 57

Claim 57 recites "wherein the first lever and the second lever are coupled to the mounting member such that the first lever and the second lever are located above the bicycle handlebar when the shift control device is mounted to the bicycle handlebar." As noted above when discussing claim 14, Ose's control device (A) is attached to a bicycle handlebar (H). Handlebar (H) comprises a main handlebar (H1) and sub-handlebars (H2) that project forward. Control device (A) is supported *below* handlebar (H) by a support bracket (11) which, as shown in Fig. 1, extends downwardly from handlebar (H2). Thus, levers (4) and (10) are located below handlebar (H) for the same reasons applied to claim 14.

Claims 70, 72-74, 76-77 and 93

Independent claim 70 recites "wherein the positioning member moves along a first path between an engagement position, where the positioning member engages the positioning unit, and a disengagement position where the positioning member is disengaged from the positioning unit." As stated at page 3 of the final office action, the positioning member was interpreted to be Ose's positioning member (16), and the positioning unit was interpreted to be Ose's winder (3). However,

Ose's positioning member (16) is permanently spline-connected to winder (3) as shown in Fig. 2. There is never a time that positioning member (16) disengages from winder ("positioning unit") (3).

Claim 70 also recites "wherein the positioning member moves along a second path that is different from a first path." Ose fails to disclose this feature.

Claim 71

Claim 70 recites "wherein movement of the positioning member along the second path includes movement other than rotation of the positioning member." Ose's positioning member (16) only rotates.

Claim 75

Claim 75 recites "wherein the positioning member includes a projection, and wherein an opening is disposed with the mounting member." From parent claim 73, the projection engages the opening. Ose's positioning member (16) does not have a projection that engages an opening disposed with mounting member (11).

Claim 78

Claim 78 recites "wherein the positioning member comprises a positioning pawl." Ose's positioning member (16) does not comprise a pawl.

Claims 79-84

Claim 79 recites "wherein movement of the positioning pawl along the second path includes movement other than rotation of the positioning pawl." In addition to the fact that Ose's positioning member (16) does not comprise a pawl, Ose's positioning member (16) only rotates.

Claim 85

Claim 83 recites a biasing member that biases the positioning pawl toward the engagement position. In addition to the fact that Ose's positioning member (16) does not comprise a pawl, there

is no biasing member that biases Ose's positioning member (16) toward an engagement position with winder (3).

Claims 86-88

Claim 86 recites "wherein the positioning pawl comprises a mounting axle that engages an opening disposed with the mounting member, wherein the positioning pawl rotates around the mounting axle to move along the first path between the engagement position and the disengagement position." In addition to the fact that Ose's positioning member (16) does not comprise a pawl that moves between engagement position and a disengagement position, Ose's positioning member (16) does not include a mounting axle that engages an opening disposed with mounting member (11).

Claim 89.

Claim 89 recites a release lever that moves the positioning pawl between the engagement position and the disengagement position. In addition to the fact that Ose's positioning member (16) does not comprise a pawl, Ose fails to disclose a release lever that moves positioning member (16) between an engagement position and a disengagement position with winder (3).

Respectfully submitted,

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VIII. CLAIMS APPENDIX

CLAIM 1. A shift control device for a bicycle transmission comprising:

a mounting member adapted to mount the shift control device to a bicycle;

a first lever operatively coupled to the mounting member such that the first lever automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever, wherein the first lever moves in a first plane;

a second lever operatively coupled to the mounting member for movement in a second plane between a rest position and an operating position such that the second lever returns to the rest position after moving to the operating position;

wherein the first plane is substantially parallel to the second plane;

a positioning unit that rotates to a plurality of positions corresponding to gear positions of the bicycle; and

a positioning member that moves relative to the second lever and that is controlled by the second lever to operate the positioning unit.

CLAIM 2. The device according to claim 1 wherein the first lever rotates within the first plane.

CLAIM 3. The device according to claim 1 wherein the second lever rotates within the second plane.

CLAIM 4. The device according to claim 1 wherein the positioning unit moves to the plurality of positions corresponding to gear positions of the bicycle in response to movement of the first lever and the second lever.

CLAIM 5. The device according to claim 4 wherein the positioning unit moves in a first positioning unit direction in response to movement of the first lever, and wherein the positioning unit moves in a second positioning unit direction opposite the first positioning unit direction in response to movement of the second lever.

CLAIM 6. The device according to claim 5 wherein the first lever moves in a first lever direction to move the positioning unit in the first positioning unit direction, wherein the second lever moves in a second lever direction to move the positioning unit in the second positioning unit direction, wherein the first lever direction is the same as the second lever direction.

CLAIM 7. The device according to claim 5 wherein the first lever rotates in a first lever direction to move the positioning unit in the first positioning unit direction, and wherein the second lever rotates in a second lever direction to move the positioning unit in the second positioning unit direction.

CLAIM 8. The device according to claim 7 wherein the first lever direction is the same as the second lever direction.

CLAIM 9. The device according to claim 5 wherein the positioning member maintains the positioning unit in each of the plurality of positions corresponding to gear positions of the bicycle.

CLAIM 10. The device according to claim 9 wherein the positioning member allows the positioning unit to move in the second positioning unit direction in response to movement of the second lever.

CLAIM 11. The device according to claim 10 further comprising a motion limiting member that limits movement of the positioning unit in response to movement of the second lever.

CLAIM 12. The device according to claim 11 wherein the motion limiting member is retained to the second lever.

CLAIM 13. The device according to claim 12 wherein the motion limiting member is one piece with the second lever.

CLAIM 14. The device according to claim 1 wherein the first lever and the second lever are coupled to the mounting member such that the first lever and the second lever are located above the bicycle handlebar when the shift control device is mounted to the bicycle handlebar.

CLAIM 15. A shift control device for a bicycle transmission comprising:

a mounting member adapted to mount the shift control device to a bicycle;

a first lever operatively coupled to the mounting member such that the first lever automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever;

a second lever operatively coupled to the mounting member for movement between a rest position and an operating position such that the second lever returns to the rest position after moving to the operating position;

a positioning unit that rotates to a plurality of positions corresponding to gear positions of the bicycle; and

a motion limiting member operatively coupled to the second lever to limit motion of the positioning unit during operation of the second lever.

CLAIM 16. The device according to claim 15 wherein the motion limiting member moves together with the second lever.

CLAIM 17. The device according to claim 16 wherein the motion limiting member is one piece with the second lever.

CLAIM 18. The device according to claim 15 wherein the positioning unit rotates in a first positioning unit direction in response to movement of the first lever, and wherein the positioning unit rotates in a second positioning unit direction opposite the first positioning unit direction in response to movement of the second lever.

CLAIM 19. The device according to claim 18 wherein the first lever moves in a first lever direction to rotate the positioning unit in the first positioning unit direction, wherein the second lever moves in a second lever direction to rotate the positioning unit in the second positioning unit direction, and wherein the first lever direction is the same as the second lever direction.

CLAIM 20. The device according to claim 15 wherein the first lever rotates in a first lever direction to move the positioning unit in the first positioning unit direction, and wherein the second lever rotates in a second lever direction to move the positioning unit in the second positioning unit direction.

CLAIM 21. The device according to claim 20 wherein the first lever direction is the same as the second lever direction.

CLAIM 22. The device according to claim 15 further comprising a positioning member that maintains the positioning unit in each of the plurality of positions.

CLAIM 23. The device according to claim 22 wherein the positioning member allows the positioning unit to move in the second positioning unit direction in response to movement of the second lever.

CLAIM 24. The device according to claim 23 wherein the motion limiting member moves together with the second lever.

CLAIM 25. The device according to claim 24 wherein the motion limiting member is one piece with the second lever.

CLAIM 26. The device according to claim 15 wherein the first lever and the second lever are coupled to the mounting member such that the first lever and the second lever are located above the bicycle handlebar when the shift control device is mounted to the handlebar.

CLAIM 27. The device according to claim 15 wherein the first lever moves in a first plane, wherein the second lever moves in a second plane, and wherein the first plane is substantially parallel to the second plane.

CLAIM 28 (CURRENTLY AMENDED): A shift control device for a bicycle transmission comprising:

a mounting member adapted to mount the shift control device to a bicycle handlebar;

a first lever operatively coupled to the mounting member such that the first lever automatically stops at a plurality of positions corresponding to gear positions of the bicycle transmission in addition to beginning and end positions of a range of motion of the first lever;

a second lever operatively coupled to the mounting member for movement between a rest position and an operating position such that the second lever returns to the rest position after moving to the operating position;

a positioning unit that rotates to a plurality of positions corresponding to gear positions of the bicycle transmission in response to movement of one of the first lever and the second lever; and

wherein the first lever and the second lever are coupled to the mounting member such that the first lever and the second lever are located above the bicycle handlebar when the shift control device is mounted to the handlebar.

CLAIM 29. The device according to claim 28 wherein the first lever moves in a first plane, wherein the second lever moves in a second plane, and wherein the first plane is substantially parallel to the second plane.

CLAIM 30. The device according to claim 28 wherein the positioning unit rotates to a plurality of positions corresponding to gear positions of the bicycle transmission in response to movement of the first lever and the second lever.

CLAIM 31. The device according to claim 30 wherein the positioning unit rotates to the plurality of positions corresponding to gear positions of the bicycle transmission in response to rotation of the first lever and the second lever.

CLAIM 32. The device according to claim 30 wherein the positioning unit moves in a first positioning unit direction in response to movement of the first lever, and wherein the positioning unit moves in a second positioning unit direction opposite the first positioning unit direction in response to movement of the second lever.

CLAIM 33. The device according to claim 32 wherein the first lever moves in a first lever direction to move the positioning unit in the first positioning unit direction, wherein the second lever moves in a second lever direction to move the positioning unit in the second positioning unit direction, and wherein the first lever direction is the same as the second lever direction.

CLAIM 34. The device according to claim 32 wherein the first lever rotates in a first lever direction to move the positioning unit in the first positioning unit direction, and wherein the second lever rotates in a second lever direction to move the positioning unit in the second positioning unit direction.

CLAIM 35. The device according to claim 34 wherein the first lever direction is the same as the second lever direction.

CLAIM 36. The device according to claim 32 further comprising a positioning member that maintains the positioning unit in each of the plurality of positions corresponding to gear positions of the bicycle transmission.

CLAIM 37. The device according to claim 36 wherein the positioning member allows the positioning unit to move in the second positioning unit direction in response to movement of the second lever.

CLAIM 38. The device according to claim 37 further comprising a motion limiting member that limits movement of the positioning unit in response to movement of the second lever.

CLAIM 39. The device according to claim 38 wherein the motion limiting member is retained to the second lever.

CLAIM 40. The device according to claim 39 wherein the motion limiting member is one piece with the second lever.

CLAIM 41. A bicycle control apparatus comprising:

a mounting member adapted to mount the bicycle control apparatus to a bicycle;

a positioning unit coupled to the mounting member for moving to a plurality of positions; and

a positioning member that maintains the positioning unit in each of the plurality of positions, wherein the positioning member comprises a material that deforms in response to excessive force applied between the positioning member and the positioning unit to release the positioning unit from a maintained position.

CLAIM 42. The apparatus according to claim 41 further comprising a first lever operatively coupled to the positioning unit so that the positioning unit moves in response to movement of the first lever.

CLAIM 43. The apparatus according to claim 42 wherein the first lever stops at a plurality of positions corresponding to gear positions of the bicycle transmission.

CLAIM 44. The apparatus according to claim 42 further comprising a second lever operatively coupled to the positioning unit so that the positioning unit moves in response to movement of the second lever.

CLAIM 45. The apparatus according to claim 44 wherein the positioning unit moves in a first positioning unit direction in response to movement of the first lever, and wherein the positioning unit moves in a second positioning unit direction opposite the first positioning unit direction in response to movement of the second lever.

CLAIM 46. The apparatus according to claim 45 wherein the first lever moves in a first lever direction to move the positioning unit in the first positioning unit direction, wherein the second lever moves in a second lever direction to move the positioning unit in the second positioning unit direction, wherein the first lever direction is the same as the second lever direction.

CLAIM 47. The apparatus according to claim 45 wherein the first lever rotates in a first lever direction to move the positioning unit in the first positioning unit direction, and wherein the second lever rotates in a second lever direction to move the positioning unit in the second positioning unit direction.

CLAIM 48. The apparatus according to claim 47 wherein the first lever direction is the same as the second lever direction.

CLAIM 49. The apparatus according to claim 45 wherein the positioning member allows the positioning unit to move in the second positioning unit direction in response to movement of the second lever.

CLAIM 50. The apparatus according to claim 49 further comprising a motion limiting member that limits movement of the positioning unit in response to movement of the second lever.

CLAIM 51. The apparatus according to claim 50 wherein the motion limiting member is retained to the second lever.

CLAIM 52. The apparatus according to claim 51 wherein the motion limiting member is one piece with the second lever.

CLAIM 53. The apparatus according to claim 44 wherein the first lever and the second lever are coupled to the mounting member such that the first lever and the second lever are located above the bicycle handlebar when the shift control device is mounted to the handlebar.

CLAIM 54. The apparatus according to claim 44 wherein the first lever moves in a first plane, wherein the second lever moves in a second plane, and wherein the first plane is substantially parallel to the second plane.

CLAIM 55. A shift control device for a bicycle transmission comprising:

a mounting member adapted to mount the shift control device to a bicycle;

a positioning unit coupled to the mounting member for moving to a plurality of positions;

a first lever that moves in a first lever direction to move the positioning unit in a first gear position direction;

a second lever that moves in a second lever direction to move initiate movement of the positioning unit in a second gear position direction opposite the first gear position direction;

wherein the first lever direction is the same as the second lever direction;

a motion allowing member coupled to the mounting unit to allow movement of the positioning unit in the second gear position direction; and

a motion limiting member retained to the second lever and moving in the second direction to limit motion of the positioning unit in the second gear position direction during operation of the second lever.

CLAIM 56. The device according to claim 55 wherein the first lever direction is one of a clockwise and a counterclockwise direction.

CLAIM 57. The device according to claim 55 wherein the first lever and the second lever are coupled to the mounting member such that the first lever and the second lever are located above the bicycle handlebar when the shift control device is mounted to the handlebar.

CLAIM 58. The device according to claim 55 wherein the first lever moves in a first plane, wherein the second lever moves in a second plane, and wherein the first plane is substantially parallel to the second plane.

CLAIMS 59-69 (CANCELED).

CLAIM 70. A bicycle control apparatus comprising:

a mounting member adapted to be mounted to a bicycle;

a positioning unit coupled to the mounting member for moving to a plurality of positions;

a positioning member that maintains the positioning unit in each of the plurality of positions;

wherein the positioning member moves along a first path between an engagement position, where the positioning member engages the positioning unit, and a disengagement position where the positioning member is disengaged from the positioning unit; and

wherein the positioning member moves along a second path that is different from the first path.

CLAIM 71. The apparatus according to claim 70 wherein movement of the positioning member along the second path includes movement other than rotation of the positioning member.

CLAIM 72. The apparatus according to claim 70 wherein the positioning member moves along the second path when the positioning unit moves to at least one of the plurality of positions.

CLAIM 73. The apparatus according to claim 70 wherein the positioning member includes one of a projection and an opening that engages a corresponding other one of a projection and an opening disposed with the mounting member.

CLAIM 74. The apparatus according to claim 73 wherein the positioning member rotates around the projection to move between the engagement position and the disengagement position.

CLAIM 75. The apparatus according to claim 74 wherein the positioning member includes the projection, and wherein the opening is disposed with the mounting member.

CLAIM 76. The apparatus according to claim 70 wherein the positioning unit rotates to each of the plurality of positions.

CLAIM 77. The apparatus according to claim 76 wherein the positioning unit includes a plurality of positioning teeth, and wherein the positioning member engages at least one of the plurality of positioning teeth to maintain the positioning unit in each of the plurality of positions.

CLAIM 78. The apparatus according to claim 77 wherein the positioning member comprises a positioning pawl.

CLAIM 79. The apparatus according to claim 78 wherein movement of the positioning pawl along the second path includes movement other than rotation of the positioning pawl.

CLAIM 80. The apparatus according to claim 79 wherein the positioning unit comprises a takeup element for pulling and releasing a control element.

CLAIM 81. The apparatus according to claim 80 wherein the takeup element includes a winding surface.

CLAIM 82. The apparatus according to claim 81 wherein the winding surface defines a wire winding groove.

CLAIM 83. The apparatus according to claim 80 wherein the plurality of positioning teeth are disposed on an outer peripheral surface of the takeup element.

CLAIM 84. The apparatus according to claim 80 wherein the positioning pawl moves along the second path when the positioning unit rotates to at least one of the plurality of positions and the positioning pawl is in the engagement position.

CLAIM 85. The apparatus according to claim 84 further comprising a biasing member that biases the positioning pawl toward the engagement position.

CLAIM 86. The apparatus according to claim 85 wherein the positioning pawl comprises a mounting axle that engages an opening disposed with the mounting member, wherein the positioning pawl rotates around the mounting axle to move along the first path between the engagement position and the disengagement position.

CLAIM 87. The apparatus according to claim 86 wherein the opening is an elongated opening, and wherein the mounting axle moves within the elongated opening to move along the second path.

CLAIM 88. The apparatus according to claim 87 wherein the mounting opening is formed in the mounting member.

CLAIM 89. The apparatus according to claim 87 further comprising a release lever that moves the positioning pawl between the engagement position and the disengagement position.

CLAIM 90 (NEW): The apparatus according to claim 41 wherein the positioning member flexes in response to excessive force applied between the positioning member and the positioning unit to release the positioning unit from the maintained position.

CLAIM 91. The apparatus according to claim 90 wherein the positioning member comprises a pawl having a pawl tooth disposed on a pawl body.

CLAIM 92. The apparatus according to claim 91 wherein a slit is disposed between the pawl tooth and the pawl body so that the pawl tooth flexes relative to the pawl body to release the positioning unit from the maintained position.

CLAIM 93. The apparatus according to claim 70 wherein the positioning member moves along the second path when the positioning member is in the engagement position.

IX. EVIDENCE APPENDIX

1) U.S. Patent No. 5,768,945 issued to Ose and entered into the record by the Examiner in the office action dated January 11, 2008.

X. RELATED PROCEEDINGS APPENDIX

None

US005768945A

United States Patent [19]

Ose

[11] Patent Number: 5,768,945

[45] Date of Patent: Jun. 23, 1998

[54] **EXTENSION HANDLE FOR A BICYCLE SHIFTING DEVICE**

[75] Inventor: **Kenji Ose**, Sakai, Japan

[73] Assignee: **Shimano, Inc.**, Osaka, Japan

[21] Appl. No.: **601,097**

[22] Filed: **Feb. 14, 1996**

[51] **Int. Cl.**[6] **G05G 11/00**

[52] **U.S. Cl.** **74/489**; 74/502.2; 74/475

[58] **Field of Search** 74/489, 502.2, 74/475, 551.8, 551.9

[56] **References Cited**

U.S. PATENT DOCUMENTS

1,319,627	10/1919	Sentinella	74/489
3,915,028	10/1975	Kine	74/489
5,012,692	5/1991	Nagano	74/489
5,203,213	4/1993	Nagano	74/489
5,287,766	2/1994	Nagano	74/502.2
5,299,466	4/1994	Heilbron	74/502.2
5,392,669	2/1995	Li	74/502.2
5,626,058	5/1997	Karpowich et al.	74/502.2 X
5,678,455	10/1997	Watarai	74/489

FOREIGN PATENT DOCUMENTS

719 702 A2	7/1996	European Pat. Off.	B62M 25/04

OTHER PUBLICATIONS

European search report for EP 97300465.8, dated May 23, 1997.

Primary Examiner—Charles A. Marmor
Assistant Examiner—David M. Fenstermacher
Attorney, Agent, or Firm—James A. Deland

[57] **ABSTRACT**

A bicycle shift control device for attachment to a handlebar including a first grip extending laterally with respect to the bicycle and a second grip extending forwardly with respect to the bicycle. The device includes first and second shift levers extending from the shift control device so that the first and second shift levers are disposed in close proximity to the first grip and to the second grip when the shifting device is mounted to the bicycle. Each shift lever includes a first finger tab positioned so that the first finger tab is disposed in close proximity to the first grip when the shift control device is mounted to the bicycle, and a second finger tab positioned so that the second finger tab is disposed in close proximity to the second grip when the shift control device is mounted to the bicycle. The first shift lever may extend generally parallel to the second shift lever and/or the first shift lever may be disposed in close proximity to the second shift lever for a majority of the length of the first shift lever. The shift operating device may be constructed so that the shift levers also function as brake levers.

25 Claims, 8 Drawing Sheets

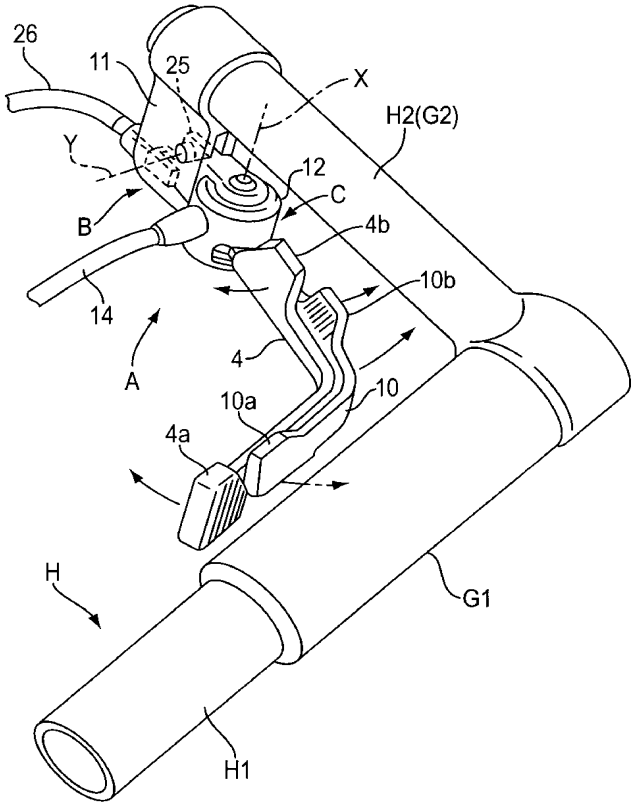


FIG. 1

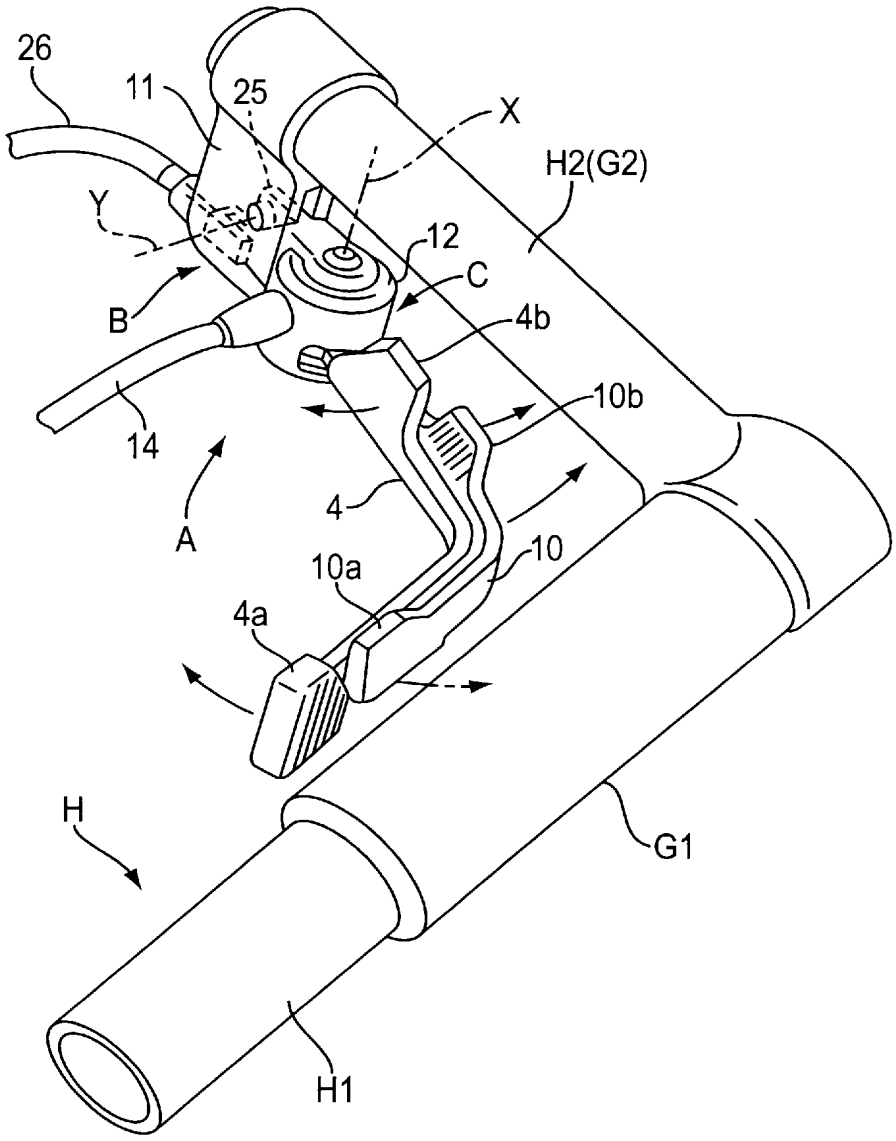


FIG. 2

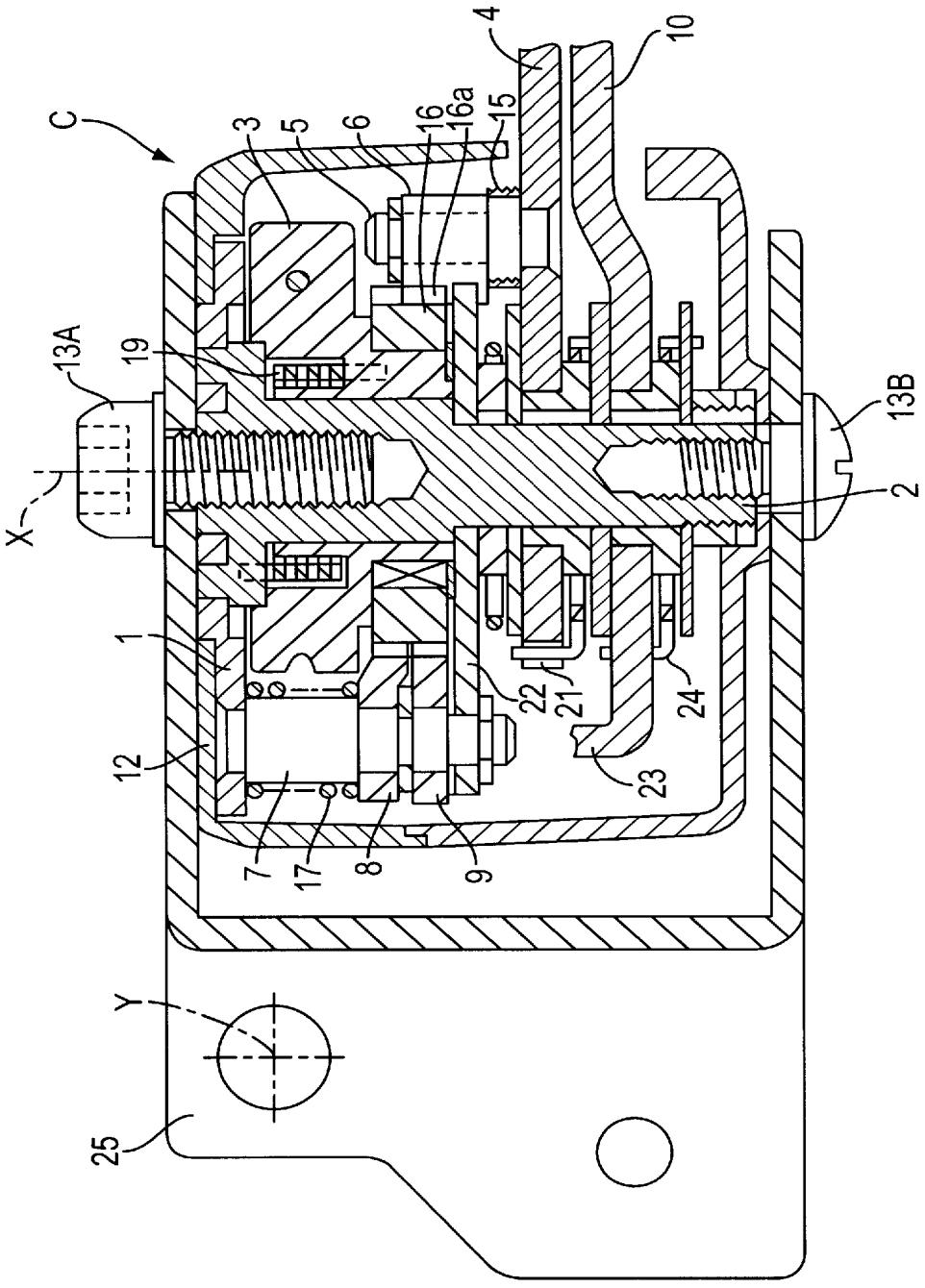


FIG. 3

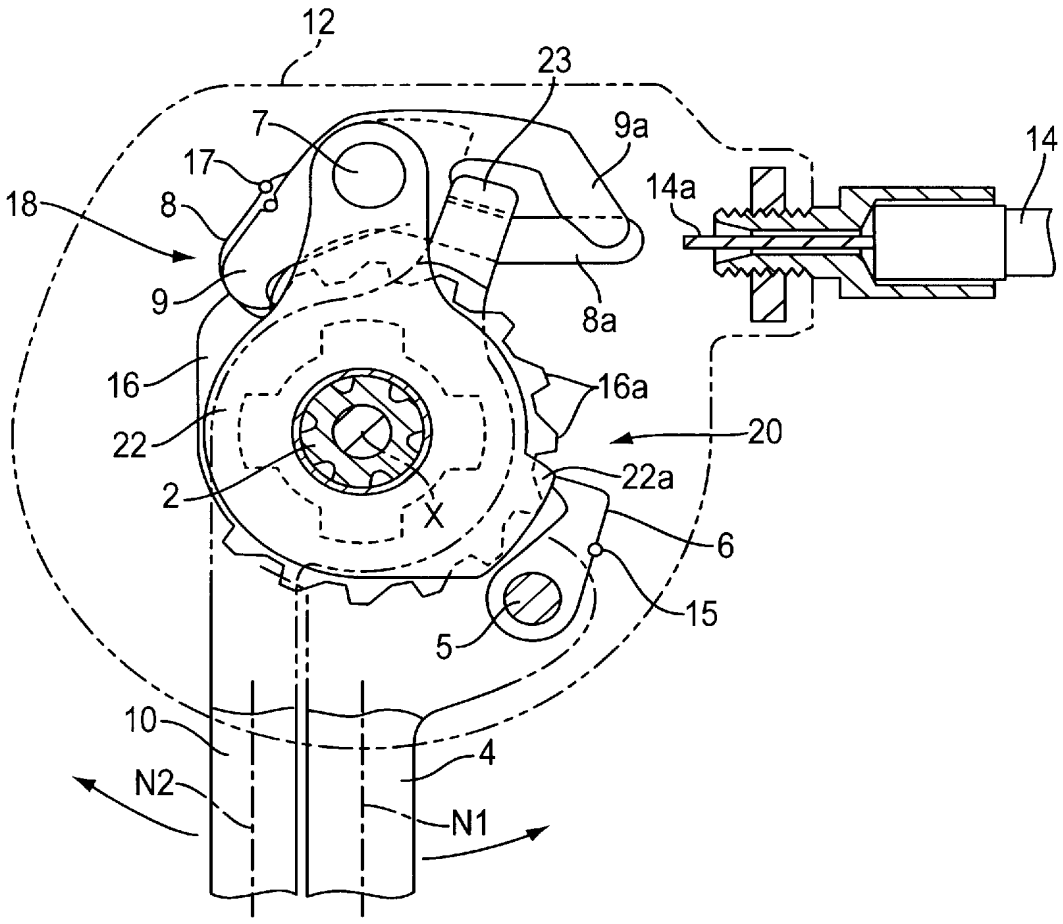


FIG. 4

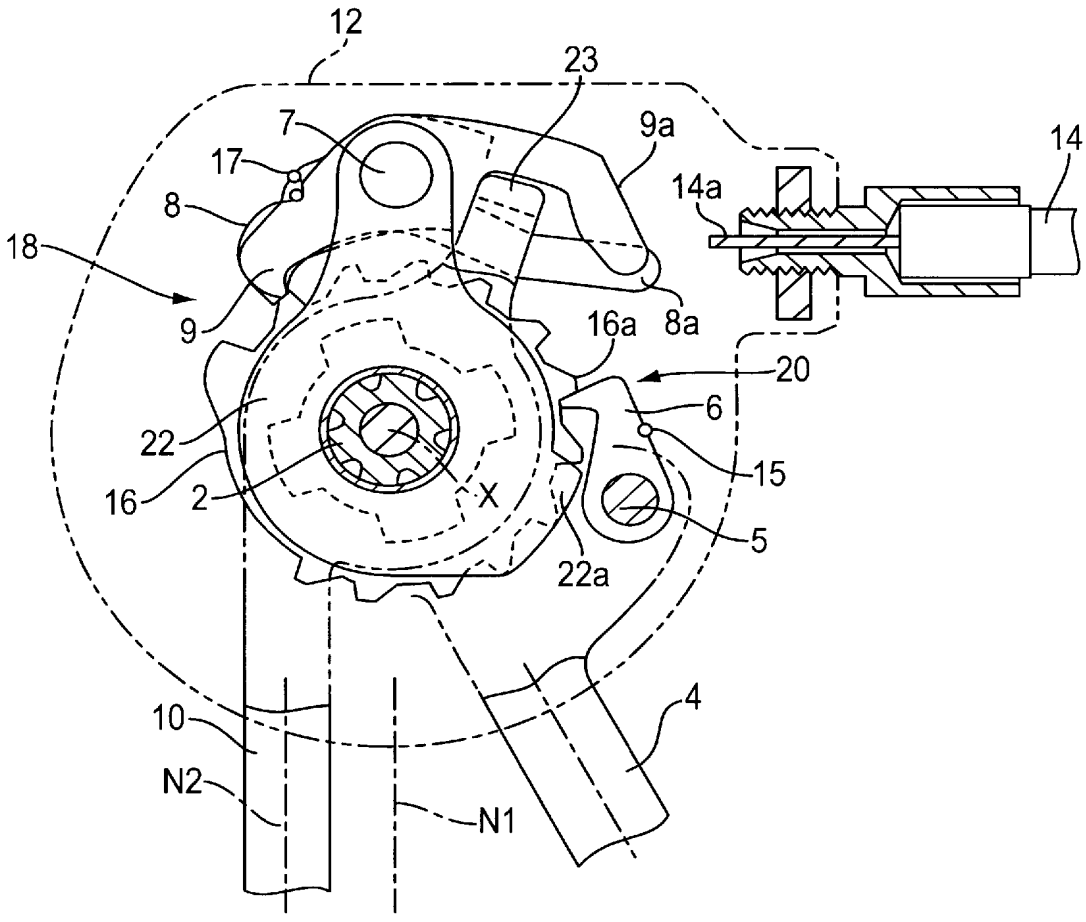


FIG. 5

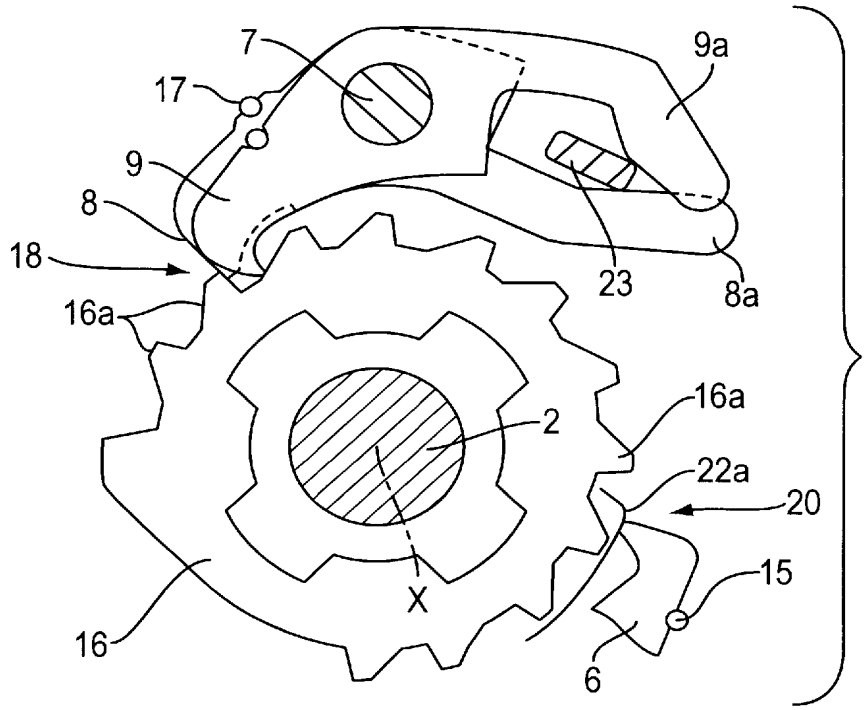


FIG. 6

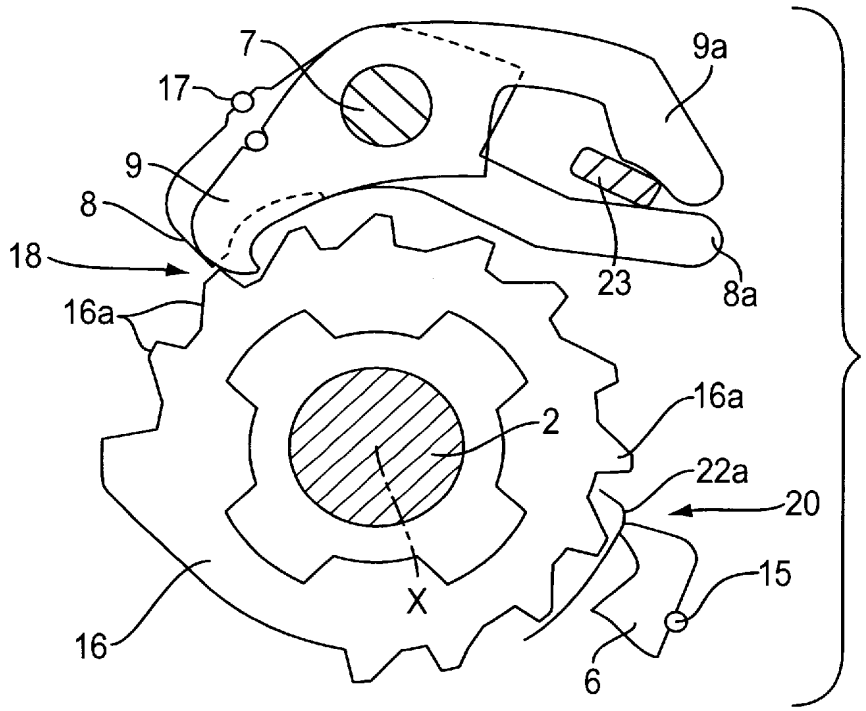


FIG. 7

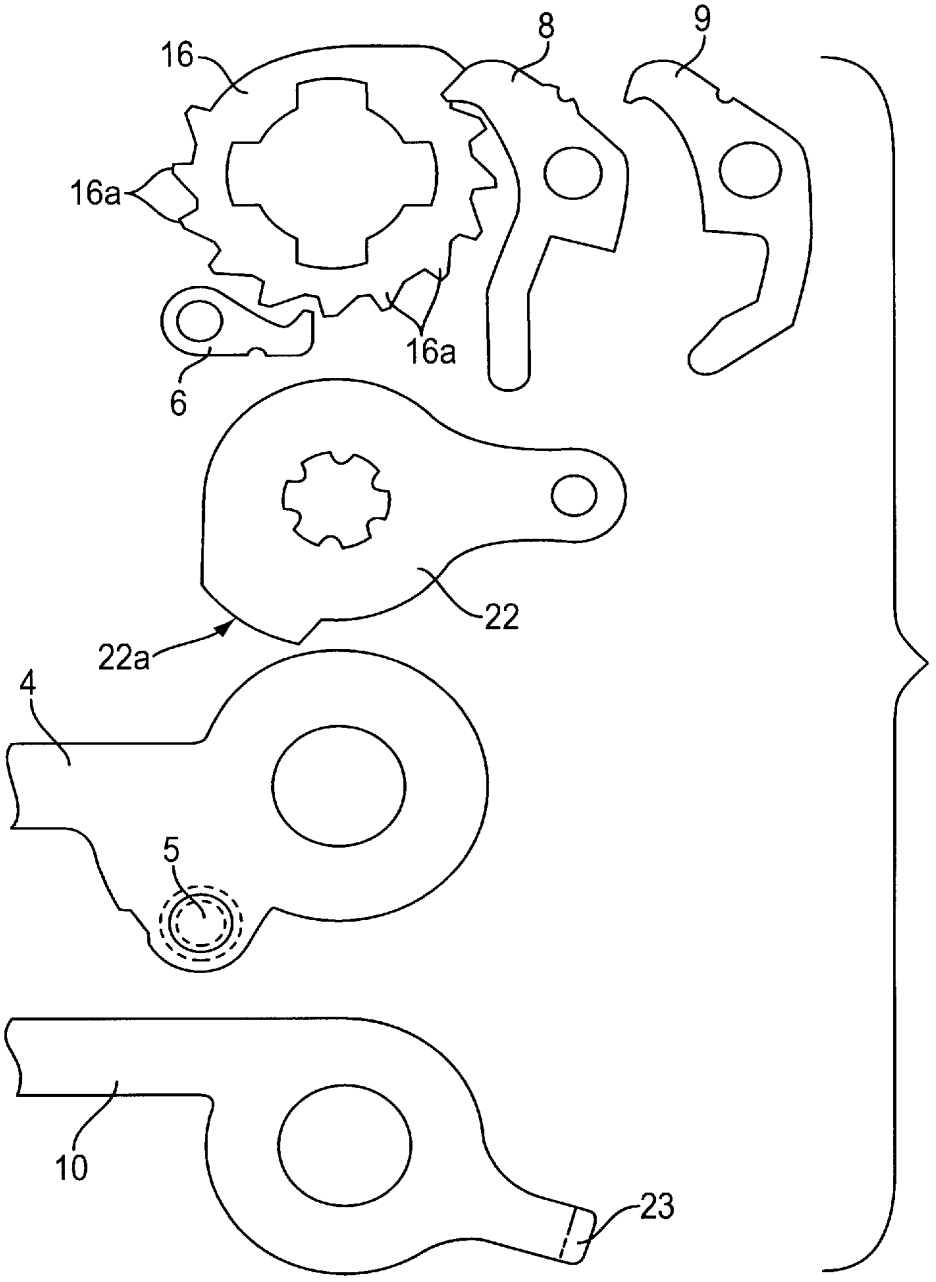
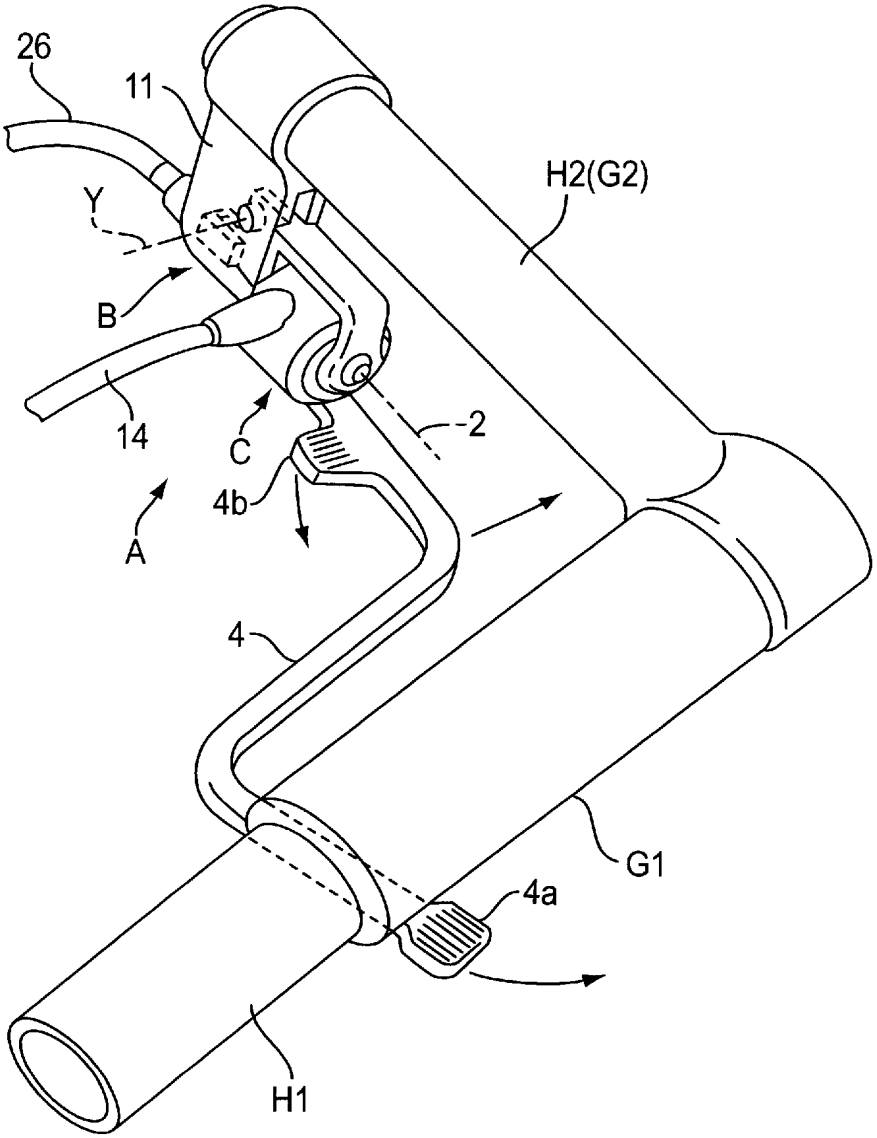


FIG. 8



EXTENSION HANDLE FOR A BICYCLE SHIFTING DEVICE

BACKGROUND OF THE INVENTION

The present invention is directed to bicycle control devices and, more specifically, to a device which controls the shifting of a bicycle transmission.

Bicycle shift control devices are often mounted to handlebars so that the shift control device may be operated by the cyclist's thumb or index finger while the cyclist is grasping the handlebar. In the case of bicycles equipped with laterally extending handlebars, extension members are often attached to the ends of the handlebar so that the extension members extend forwardly from the handlebar. The extension members provide additional positions to grasp the handlebar to accommodate variations in traveling speed or posture. Unfortunately, if the shift control device is mounted to the main handlebar and the cyclist is grasping the extension member, then the cyclist must change the hand position in order to operate the shift control device. The same is true if the shift control device is mounted on the extension member and the cyclist is grasping the main handlebar.

SUMMARY OF THE INVENTION

The present invention is directed to a bicycle shift control device which allows the cyclist to operate the shift control device regardless of the position of the cyclist's hand on the handlebar and without requiring the cyclist to remove the hand from the handlebar. One embodiment of the present invention is directed to a bicycle shift control device for attachment to a handlebar including a first grip extending laterally with respect to the bicycle and a second grip extending forwardly with respect to the bicycle. In this embodiment the device comprises a first shift lever extending from the shift control device so that the first shift lever is disposed in close proximity to the first grip and to the second grip when the shifting device is mounted to the bicycle. The first shift lever includes a first finger tab positioned so that the first finger tab is disposed in close proximity to the first grip when the shift control device is mounted to the bicycle, and a second finger tab positioned so that the second finger tab is disposed in close proximity to the second grip when the shift control device is mounted to the bicycle.

In a more specific embodiment, the first shift lever includes a first arm portion for extending along the first grip when the shift control device is mounted to the bicycle, and a second arm portion for extending along the second grip when the shift control device is mounted to the bicycle. In this embodiment the first finger tab is disposed on the first arm portion, and the second finger tab is disposed on the second arm portion. In an alternative embodiment, the first shift lever includes a first arm portion for extending in close proximity to the first grip when the shift control device is mounted to the bicycle, a second arm portion for extending along the second grip when the shift control device is mounted to the bicycle, and a third arm portion for extending along the first grip. The first finger tab is disposed on the first arm portion, and the second finger tab is disposed on the second arm portion. The third arm portion extends generally perpendicularly to the first arm portion and to the second arm portion, and the first arm portion extends generally parallel to the second arm portion.

In a more specific embodiment, a second shift lever extends from the shift control device so that the second shift lever is disposed in close proximity to the first grip and to the

second grip when the shifting device is mounted to the bicycle. The second shift lever includes a first finger tab positioned so that the first finger tab is disposed in close proximity to the first grip when the shift control device is mounted to the bicycle, and a second finger tab positioned so that the second finger tab is disposed in close proximity to the second grip when the shift control device is mounted to the bicycle. In this embodiment the first shift lever may extend generally parallel to the second shift lever and/or the first shift lever may be disposed in close proximity to the second shift lever for a majority of the length of the first shift lever.

If desired, the shift operating device may be constructed so that the shift levers also function as brake levers, again without requiring the cyclist to remove the hand from the handlebar. In this embodiment the first and/or second shift levers may be connected to the shift control device for pivoting about a first axis, and the shift control device is adapted to be coupled to the bicycle for pivoting about a second axis that is different from the first axis. The shift control device includes a brake cable attachment location for attachment to a brake cable so that the brake may be operated by pulling the shift levers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a particular embodiment of a shift control device according to the present invention attached to a bicycle;

FIG. **2** is a cross sectional view of a particular embodiment of a shift controller according to the present invention;

FIG. **3** is a bottom view showing the ratchet and pawl mechanism used in the shift controller;

FIG. **4** is a bottom view illustrating the operation of the ratchet and pawl mechanism shown in FIG. **3** when the winding lever is moved away from its initial position;

FIG. **5** is a detailed view of the ratchet and pawl mechanism shown in FIG. **3** illustrating the engagement of the positioning pawls with the ratchet mechanism after the winding lever is returned to its initial position;

FIG. **6** is a detailed view of the ratchet and pawl mechanism shown in FIG. **3** illustrating the operation of the positioning pawls when the rewinding lever is moved away from its initial position;

FIG. **7** is an exploded view of major portions of the shift controller shown in FIG. **2**; and

FIG. **8** is a perspective view of an alternative embodiment of a shift control device according to the present invention attached to a bicycle.

DETAILED DESCRIPTION OF THE EMBODIMENTS

As shown in FIG. **1**, a control device A is attached to a bicycle handlebar H and is used to control various shifters (not shown) and brakes (not shown) internally mounted in rear-wheel hubs or externally mounted for rear use, front use, or the like. The handlebar H comprises a main handlebar **H1** for turtling the bicycle frame to the left and right, and sub-handlebars **H2** projecting forward beyond the bicycle frame at the left and right ends of the main handlebar **H1**. The control device A is attached with the aid of a support bracket **11** to the tip of a sub-handlebar **H2**. The control device A combines a shift controller C and a brake controller B. The shift controller C will be described first.

As shown in FIG. **2**, a winder **3** is rotatably attached to a support member **1** in the form of a flat plate with the aid of

a spindle **2** incapable of rotating with respect to the support member **1**. A winding lever **4** serving as a first shift lever for rotatably operating the winder **3** in the winding direction and letting it automatically return to the original position is rotatably attached to the spindle **2** with the aid of a one-way mechanism described below. The winding lever **4** and the winder **3** are configured in such a way that they both can rotate about the axis X of the spindle **2**.

A pawl-pivoted spindle **5** is fixed to the winding lever **4**, and a feed pawl **6** for the winder **3** is swingably attached to the pawl-pivoted spindle **5**. A first positioning pawl **8** and a second positioning pawl **9** are swingably attached to the support member **1** with the aid of a fixed pawl-pivoted spindle **7**. A rewinding lever **10** functioning as a second shift lever rotatably operates the winder **3** in the payoff direction by the swingable operation of these first positioning pawl **8** and second positioning pawl **9**. The rewinding lever **10** fits on the spindle **2** in such a way that rotation about the axis X of the spindle **2** is possible, and is configured in such a way that an automatic return to the initial position N2 is possible.

A cover **12** covers the support member **1**, the winder **3**, the positioning pawls **8** and **9**, the base end sides of the levers **4** and **10**, and the like. These components constitute a shift controller C for a bicycle. The two positioning pawls **8** and **9** and a positioning member **16** will be referred to as "a positioning mechanism **18**."

As shown in FIGS. **1** and **3**, shift controller C is configured in such a way that the inner cable **14***a* of a shift cable **14** from a variety of shifters (not shown) is connected to the winder **3**, and the winding of the winder **3** by the winding lever **4**, as well as the payoff of the winder **3** by the rewinding lever **10**, tighten or slacken the shift cable **14** and switch the shifter. A detailed structure will now be described.

In this embodiment, the winding lever **4** extends in the form of a cantilever at an approximate right angle along the inside of the handlebar H beyond the base end portions that are set on the spindle **2**. The winding lever **4** comprises a second finger tab **4***b* that faces a second grip G2 provided to the sub-handlebar H2, and a first finger tab **4***a* that faces a first grip G1 provided to the main handlebar H1. To shift gears, the first finger tab **4***a* is pushed with the index finger and moved forward with respect to the frame while the hand grasps the first grip G1, or the second finger tab **4***b* is pushed with the thumb and moved in the direction of the arrow while the hand grasps the second grip G2. As a result, the inner cable **14***a* of the shift cable **14** is wound by the winder **3**.

As shown in FIG. **4**, when the winding lever **4** is moved from the initial position N1 away from the first grip G1, the feed pawl **6** supported on the guide member **22** described below is energized by a feed pawl spring **15**, with the result that, as shown in FIG. **5**, the boss portion of the winder **3** engages one of the ratchet teeth **16***a* of the positioning member **16** assembled in such a way that it can turn as a whole, the winder **3** is rotated in the winding direction through the intermediary of this positioning member **16**, and the inner cable **14***a* is wound up. In the process, the first positioning pawl **8** and second positioning pawl **9** are disengaged from the ratchet tooth **16***a* by the outward pushing action caused by the tooth shape of the ratchet teeth **16***a*, making it possible to rotate the winder **3** with the aid of the winding lever **4**.

When the winding lever **4** is swung to a predetermined angle, the cable winding stroke of the winder **3** reaches a prescribed stroke, the shifter is switched from the pre-shifting state to the target speed state on the high speed side, and the first positioning pawl **8** is caused to engage one of the ratchet teeth **16***a* by the energizing action of a pawl spring **17**, positioning and holding the winder **3** in the target position. Thus, even when the operating force exerted on the winding lever **4** is released, the positioning mechanism **18**, which is composed of the first positioning pawl **8**, the positioning member **16**, and the like, positions the winder **3** in the target position and keeps it in this position irrespective of the energizing force of an unwinding spring **19** exerted on the winder **3**, or the cable pulling force based on the self-restoring force of the shifter.

The winding lever **4** is coupled to the winder **3** via a one-way mechanism **20** composed of the feed pawl **6**, the positioning member **16**, and the like, so the initial position N1 is automatically restored by the energizing action of a return spring **21** when the operating force on the winding lever **4** is released. The rewinding of the winder **3** described above is possible when this initial position N1 has been restored, because the toe of the feed pawl **6** is lifted above the guide portion **22***a* of the guide member **22** that is set on the spindle **2** without the possibility of rotation, and the coupling with the winder **3** is canceled.

The rewinding lever **10** extends in the form of a cantilever at an approximate right angle along the handlebar H beyond the base end portions that are set on the spindle **2**, and remains close and roughly perpendicular to the winding lever **4** between the winding lever **4** and the handlebar H. The winding lever **10** comprises a second finger tab **10***b* that faces the second grip G2 provided to the sub-handlebar H2, and a first finger tab **10***a* that faces the first grip G1 provided to the main handlebar H1. To shift gears, the first finger tab lO*a* is pulled with the index finger and moved backward with respect to the frame while the hand grasps the first grip G1, or the second finger tab **10***b* is pulled with the thumb and moved closer to the second grip G2 while the hand grasps the second grip G2.

The inner cable **14***a* of the shift cable **14** is repeatedly rewound by the movement of the rewinding lever **10** from the initial position N2 (idling position) toward the handlebar H. More specifically, when the rewinding lever **10** is pulled from the initial position N2 toward the handlebar H, a plate-shaped release member **23** integrally projecting upward beyond the tip of the rewinding lever **10** enters the gap between the arm portion **8***a* of the first positioning pawl **8** and the arm portion **9***a* of the second positioning pawl **9**, as shown in FIG. **5**, exerting pressure on the arm portion **9***a* of the second positioning pawl **9** and forcing the toe of the second positioning pawl **9** between the ratchet teeth **16***a*. At this time, the toe of the first positioning pawl **8** comes into contact with one of the ratchet teeth **16***a*, the positioning of the winder **3** is retained, and the winder **3** does not rotate.

If the rewinding lever **10** is further pulled from this state until a prescribed position is reached, the release member **23** will exert pressure on the arm portion **8***a* of the first positioning pawl **8**, as shown in FIG. **6**, and the toe of the first positioning pawl **8** will be disengaged from the previously contacted ratchet tooth **16***a*. When this happens, the winder **3** rotates a certain amount in the rewinding direction because of the energizing action of the unwinding spring **19** and the cable-pulling action of the shifter. At this time, the ratchet tooth **16***a* previously disengaged from the first positioning pawl **8** comes into contact with the toe of the second positioning pawl **9**, preventing the winder **3** from uncontrollably rotating in the rewinding direction.

When the operating force exerted on the rewinding lever **10** is released, the rewinding lever **10** is automatically

returned to the initial position N1 by the energizing action of the a return spring **24**, and the release member **23** releases the pressing exerted on the arm portion **9***a* of the second positioning pawl **9**. When this happens, the second positioning pawl **9** is disengaged from the ratchet tooth **16***a* by the outward pushing of the ratchet tooth **16***a* of the rotating winder **3** due to the toe shape of this second positioning pawl **9**, the winder **3** rotates in the rewinding direction, the cable rewinding stroke of the winder **3** reaches a prescribed stroke, and the shifter is switched from the pre-shifting state to the next lower speed state. The toe of the first positioning pawl **8** is subsequently forced by the energizing action of the pawl spring **17** into the gap between the ratchet tooth **16***a* previously disengaged from the first positioning pawl **8** and the ratchet tooth **16***a* that follows this ratchet tooth **16***a*, and brought into contact with this subsequent ratchet tooth **16***a*, maintaining the winder **3** in the new speed state acquired following switching. Thus, operating the rewinding lever **10** makes it possible to cancel the state in which the winder **3** is held in place by the positioning mechanism **18**, and to shift the gears to the next lower speed.

As shown in FIGS. **1** and **2**, the shift controller C is fixedly attached to a swing frame **25** with the aid of two (upper and lower) bolts **13**A and **13**B screwed into the spindle **2** on the top and bottom surfaces of a cover **12** that houses the shift controller C. The swing frame **25** is attached to a support bracket **11**, itself attached to the sub-handlebar H**2**, with the aid of pivot pins to allow swinging about the pin axis Y. The pin axis Y is oriented orthogonal to the axis X of the spindle **2**. The end of a brake cable **26** that is joined to a brake device (not shown) is connected to the internal end portion of the swing frame **25**, and the brake device is actuated when the swing frame **25** is rotated. If desired, the brake cable **26** may be positioned inside the handlebar H. A coiled return spring on a pin axle acts on the swing frame **25**, providing an arrangement in which a return to the original operating position is possible. A braking operation performed by grasping the winding lever **4** and rewinding lever **10** together with the first grip G**1** or the second grip G**2**, and by lifting the two levers **4** and **10** in order to bring them closer to the first grip G**1**.

FIG. **8** is a perspective view of an alternative embodiment of a bicycle shift control device according to the present invention. In this embodiment, shifting is accomplished by a mere push with the thumb. As shown in FIG. **8**, a component that extends toward the rear of the frame is formed on the tip of a first shift lever **4**, which extends along the handlebar H beyond the shift controller C swingably supported on a support bracket **11** installed at the tip of the sub-handlebar H**2**. The rewinding lever **10** is still provided, but it has been omitted from the drawings. A first finger tab **4***a* is formed in the back end portion of this component, and a second finger tab **4***b* is formed near the support bracket **11**. The first shift lever **4** is supported in such a way that it can swing about an axis Z parallel to the axis of the sub-handlebar H**2**. Such a structure allows the first shift lever **4** to rotate about the axis Z, rotating the winder **3** when the first finger tab **4***a* is pushed in with the thumb while the first grip G**1** of the main handlebar H**1** is grasped. When the second grip G**2** of the sub-handlebar H**2** is grasped, the first shift lever **4** can be rotated about the axis Z by pressing the second finger tab **4***b* inward with the thumb in the same manner. This structure is the same as that described above in that braking can be accomplished by pulling the shift lever closer while grasping the grip G**1** or G**2**.

While the above is a description of various embodiments of the present invention, further modifications may be employed without departing from the spirit and scope of the present invention. For example, although a structure in which both the winding lever **4** and the rewinding lever **10** are swing levers was described above as a specific structural example the levers **4** and **10**, is also possible for the two levers **4** and **10** to be slide levers, or for one of them to be a swing lever and the other a slide lever. Many other structures are also possible. Thus, the scope of the invention should not be limited by the specific structures disclosed. Instead, the true scope of the invention should be determined by the following claims. Of course, although labeling symbols are used in the claims in order to facilitate reference to the figures, the present invention is not intended to be limited to the constructions in the appended figures by such labelling.

What is claimed is:

1. A bicycle shift control device for attachment to a handlebar including a first grip (G**1**) extending laterally with respect to the bicycle and a second grip (G**2**) extending forwardly with respect to the bicycle, the device comprising:

a first shift lever (**4**) extending from the shift control device so that the first shift lever (**4**) is disposed in close proximity to the first grip (G**1**) and to the second grip (G**2**) when the shifting device is mounted to the bicycle, the first shift lever (**4**) including:

a first finger tab (**4***a*) positioned so that the first finger tab (**4***a*) is disposed in close proximity to the first grip (G**1**) when the shift control device is mounted to the bicycle; and

a second finger tab (**4***b*) positioned so that the second finger tab (**4***a*) is disposed in close proximity to the second grip (G**2**) when the shift control device is mounted to the bicycle.

2. The device according to claim **1** wherein the first shift lever (**4**) includes:

a first arm portion for extending along the first grip (G**1**) when the shift control device is mounted to the bicycle, the first finger tab (**4***a*) being disposed on the first arm portion; and

a second arm portion for extending along the second grip (G**2**) when the shift control device is mounted to the bicycle, the second finger tab (**4***b*) being disposed on the second arm portion.

3. The device according to claim **2** wherein the first arm portion extends generally perpendicularly to the second arm portion.

4. The device according to claim **1** wherein the first shift lever (**4**) includes:

a first arm portion for extending in close proximity to the first grip (G**1**) when the shift control device is mounted to the bicycle, the first finger tab (**4***a*) being disposed on the first arm portion;

a second arm portion for extending along the second grip (G**2**) when the shift control device is mounted to the bicycle, the second finger tab (**4***b*) being disposed on the second arm portion;

a third arm portion for extending along the first grip (G**1**);

wherein the third arm portion extends generally perpendicularly to the first arm portion and to the second arm portion; and

wherein the first arm portion extends generally parallel to the second arm portion.

5. The device according to claim **1** wherein the first shift lever (**4**) is connected to the shift control device for pivoting about a first axis (X,Z).

6. The device according to claim **5** wherein the shift control device is adapted to be coupled to the bicycle for

pivoting about a second axis (Y), and wherein the shift control device includes a brake cable attachment location for attachment to a brake cable (**26**).

7. The device according to claim **6** wherein the second axis (Y) is different from the first axis (X,Z).

8. The device according to claim **7** wherein the first axis (X,Z) is oriented generally perpendicularly to the second axis (Y).

9. The device according to claim **5** wherein the first axis (X) is oriented generally perpendicularly to the second grip (G**2**).

10. The device according to claim **9** wherein the shift control device is adapted to be coupled to the bicycle for pivoting about a second axis (Y), and wherein the shift control device includes a brake cable attachment location for attachment to a brake cable (**26**).

11. The device according to claim **10** wherein the second axis (Y) is different from the first axis (X).

12. The device according to claim **11** wherein the first axis (X) is oriented generally perpendicularly to the second axis (Y).

13. The device according to claim **12** wherein the second axis (Y) is oriented generally parallel to the first grip (G**1**).

14. The device according to claim **5** wherein the first axis (Z) is oriented generally parallel to the second grip (G**2**).

15. The device according to claim **14** wherein the shift control device is adapted to be coupled to the bicycle for pivoting about a second axis (Y), and wherein the shift control device includes a brake cable attachment location for attachment to a brake cable (**26**).

16. The device according to claim **15** wherein the second axis (Y) is different from the first axis (Z).

17. The device according to claim **16** wherein the first axis (Z) is oriented generally perpendicularly to the second axis (Y).

18. The device according to claim **17** wherein the second axis (Y) is oriented generally parallel to the first grip (G**1**).

19. The device according to claim **1** further comprising:

a second shift lever (**10**) extending from the shift control device so that the second shift lever (**10**) is disposed in close proximity to the first grip (G**1**) and to the second grip (G**2**) when the shifting device is mounted to the bicycle, the second shift lever (**10**) including:

a first finger tab (**10***a*) positioned so that the first finger tab (**10***a*) is disposed in close proximity to the first grip (G**1**) when the shift control device is mounted to the bicycle; and

a second finger tab (**10***a*) positioned so that the second finger tab (**10** *b*) is disposed in close proximity to the second grip (G**2**) when the shift control device is mounted to the bicycle.

20. The device according to claim **19** wherein the first shift lever (**4**) extends generally parallel to the second shift lever (**10**).

21. The device according to claim **20** wherein the first shift lever (**4**) is disposed in close proximity to the second shift lever (**10**) for a majority of the length of the first shift lever (**4**).

22. The device according to claim **19** wherein one of the first shift lever (**4**) or the second shift lever (**10**) is connected to the shift operating device for causing the shift operating device to shift a bicycle transmission in an upshift direction, and wherein the other one of the first shift lever (**4**) or the second shift lever (**10**) is connected to the shift operating device for causing the shift operating device to shift the bicycle transmission in a downshift direction.

23. The device according to claim **19** wherein the first shift lever (**4**) is connected to the shift operating device for moving from a first home position (N**1**) to a first shift position, wherein the second shift lever (**10**) is connected to the shift operating device for moving from a second home position (N**2**) to a second shift position, and further comprising:

first return means for automatically returning the first shift lever (**4**) to the first home position (N**1**) when the first shift lever (**4**) is released from the first shift position; and

second return means for automatically returning the second shift lever (**10**) to the second home position (N**2**) when the second shift lever (**10**) is released from the second shift position.

24. The device according to claim **23** wherein the shift operating device includes a cable winding member (**3**) for alternately winding and unwinding a transmission cable (**14***a*), wherein the first shift lever (**4**) is coupled to the winding member (**3**) for causing the winding member (**3**) to wind the transmission cable (**14***a*) in response to movement of the first shift lever (**4**) from the first home position (N**1**)to the first shift position, and wherein the second shift lever (**10**) is coupled to the winding member (**3**) for causing the winding member (**3**) to unwind the transmission cable (**14***a*) in response to movement of the second shift lever (**10**) from the second home position (N**2**) to the second shift position.

25. A bicycle shift control device for attachment to a handlebar including a first grip (G**1**) extending laterally with respect to the bicycle and a second grip (G**2**) extending forwardly with respect to the bicycle, the device comprising:

a first shift lever (**4**) extending from the shift control device so that the first shift lever (**4**) is disposed in close proximity to the first grip (G**1**) and to the second grip (G**2**) when the shifting device is mounted to the bicycle, the first shift lever (**4**) including:

a first protrusion forming a first finger tab (**4***a*) positioned so that the first finger tab (**4***a*) is disposed in close proximity to the first grip (G**1**) when the shift control device is mounted to the bicycle; and

a second protrusion forming a second finger tab (**4***b*) positioned so that the second finger tab (**4***a*) is disposed in close proximity to the second grip (G**2**) when the shift control device is mounted to the bicycle.

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